Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
VONAGE HOLDINGS	)	
CORPORATION	)	
	)	
Petition for Declaratory Ruling	)	WC Docket No. 03-211
Concerning an Order of the Minnesota	)	
Public Utilities Commission	)	

Comments of Inclusive Technologies

Inclusive Technologies[1] respectfully submits its Comments to the Commission pursuant to the Docket Item referenced above.

Introduction and Summary

We are pleased to offer comments to the Commission solely on the issue of accessibility of **Voice over Internet Protocol (VoIP)** service as it relates to the Vonage[2] offering.

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[1] Inclusive Technologies provides consulting services in telecommunications and disability, aging, and education. Our technical services include analyses of existing products, assistance with service and product development and deployment, technology scans, and technical development of prototypes. Other services provide assistance with business practices: primary and secondary market research and analysis, customer surveys, focus groups, product trials, product management, strategic partnership development, staff training, internal team-building, and consumer and other stakeholder liaison. We provide these services to information technology companies, regulatory agencies, and consumer advocacy organizations. Inclusive's clients include the Access Board, the American Foundation for the Blind, Bell Atlantic, the California Deaf and Disabled Telecommunications Program, Computer Professionals for Social Responsibility, IBM, Microsoft, the National Institute on Disability and Rehabilitation Research, the New York City Public Schools Commissioner's Office, the New York State Diffusion Fund, Panasonic, Qualcomm, Nortel, SAIC, and SBC Communications. Inclusive Technologies recently performed a Market Monitoring Report for the Access Board, a snapshot of the state of the art of accessible telecommunications. The Report includes a description of the access features found on a wide range of telecom products, and a searchable database of over 600 specific models, for use by designers, engineers, regulators, and consumers with disabilities.

[2] We would like to make a distinction between IP telephony and Internet telephony, or IP telephony on the Internet. The former is merely the use in any context of the Internet protocol, an

Our views on the accessibility of Vonage's VoIP, briefly, are these:

First, Vonage's VoIP is **simply a voice telecommunications service**.

Second, VoIP **impacts people with disabilities now**.

Third, VoIP has **specific positive and negative access implications**.

Fourth, VoIP challenges conventional regulatory frameworks, but **effective and efficient Section 255 regulation is possible**.

Fifth, the **Commission should take specific actions** that **impose some regulations** where its jurisdiction is clear.

Vonage VoIP Background

VoIP is a rapidly growing Internet application which has gathered both business and consumer enthusiasm. It essentially substitutes a private IP-capable network or the Internet for the public switched telephone network (PSTN) for the purpose of placing and receiving voice calls. Several different versions of VoIP exist. Calls can be made from a phone or a computer, and can terminate on a phone or a computer. A network provider may be involved in some, but not others. A brief description of the Vonage offering follows.

The user arranges a service agreement with Vonage as the VoIP gateway provider. In order to place a call, the user establishes an Internet connection through an Internet service provider (ISP) – not Vonage -- and launches Vonage's VoIP software program. The user can indicate either a telephone number to be dialed (the terminating PSTN number), or a computer as the terminating party. Terminating computers may be other Vonage customers, or participants in any of the other VoIP networks with which Vonage cooperates.

The user's computer takes the audio input from the sound card and digitizes it, and the VoIP application transmits it to the Vonage server as Internet packets. If connecting to a PSTN line, the terminating server performs the same function in

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addressing and routing technique for packet networks, to carry packetized voice traffic. This may be accomplished without any connection to a public network of any sort, such as between workstations in a place of business, over an intranet. The latter is the use of the same protocol over the "public" Internet. For the purposes of these comments, we will use the phrase VoIP to refer to both private and "public" uses of the technology, its products, or services. Although the Commission is most actively concerned with public uses of VoIP, it should be aware that there are clear access issues for all IP telephony.

reverse, converting the data packets back into a voice signal. Whatever the person on the terminating number says is converted into data packets by the terminating server, which sends those packets to the user's computer via the ISP. The computer converts the data into voice.

VoIP Is a Telecommunications Service, Not an Information Service or Internet Service

The Commission has been accustomed to using a jurisdictional distinction between telecommunications services and information services. Briefly[3], the latter consists of services in which information is stored or altered in form or content, while the former does not.

However, several Internet-based services appear to blur this distinction. The range of services, and moreover the multiplicity of entities whose products consist in facilitating only part of each service, and who have no formal business relationships must tend to confuse the Commission, as it confuses consumers.

However, amidst this confusion, there should be some simple clarity. We would assert that **any service that involves immediate, intentional real-time exchange of information** between two or more parties, without either alteration of that information in form or content or access to stored information, **cannot be an information service**. Unless there is another category, it would appear to be a telecommunications service, regardless of the facilities used to provide the service. Although the Internet began as a means of transporting stored information – email and files – it has since accepted many other forms of information, among them VoIP, that do not involve storage.

VoIP meets the telecommunications service criteria.

1. There is no alteration of content, as the voice traffic from each side is reproduced as exactly as possible at the other end.

2. There is no storage of the content for later retrieval, only temporary buffering for transmission purposes when necessary.

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[3] We do not intend to present a full discussion of the distinction between telecommunications services and information services. We only wish to put forward a common sense lay position based on our imperfect understanding of telecommunications law, and we apologize in advance for any errors in our argument.

3. The communication is point-to-point.

Moreover, a service or product that is designed and marketed expressly to replicate the functionality of a telecommunications service or product should be considered regulatorily identical to the service or product it is emulating. This is especially true if the service or product's sole function is to replicate the telecommunications service or product, as in the case of IP-phones. Everything about Vonage's offering meets this criterion.

Stated another way, just because a telecommunications service is carried over a network (the Internet) that also carries information services (email, web pages, etc.) does not convert the telecommunications service into an information service.

Vonage sells only a real-time, point-to-point voice telecommunications service, not an Internet service, an information service, or access to an information service.

Inaccessible VoIP Jeopardizes People with Disabilities

The accessibility of VoIP is important to people with disabilities. Inaccessible VoIP would jeopardize their full integration in at least five ways:

- As employees, if employers adopt VoIP implementations that are not accessible
- As entrepreneurs, if the telecommunications tools required for their businesses are not accessible
- As residential customers, if the VoIP offerings are better in quality or lower in price[4] than traditional voice telecom offerings
- As students, if educational institutions adopt, as part of their curricula, VoIP implementations that are not accessible
- As citizens, if government agencies adopt, as their method of communicating with the public, VoIP implementations that are not

[4] The Vonage offering is clearly less expensive than other real-time voice communication options, and is marketed as such.

accessible

Although the transport of TTY traffic over VoIP is the most commonly mentioned concern, it is not the only one:

- People who are hard of hearing may not be able to use VoIP if the voice quality is significantly worse than conventional telephony
- Similarly, people with speech impairments or people who use voice-output communication aids may not be as intelligible to the other party if the voice quality is significantly worse than conventional telephony
- People who have low vision may not be able to use the VoIP software on-screen controls if those controls are not designed to be visually accessible
- People who are blind or have extremely low vision may not be able to use the VoIP software on-screen controls if those controls are not compatible with their screen access systems
- People with mobility limitations may not be able to use the VoIP software on-screen controls if those controls require keyboard or mouse actions that are not easy for them to perform, or if the controls are not compatible with their alternate input systems
- People with language or cognitive impairments may not be able to use the VoIP software on-screen controls if those controls are not simple enough to understand

As has happened many times before, people with disabilities are faced with a rapidly advancing technology that may further exclude them from public life, or offer them new pathways into full participation. Let us now turn toward the positive potential of VoIP.

VoIP Offers Opportunities for Improved Access to Telecommunications

It may appear that Inclusive Technologies is opposed to VoIP because of its current inaccessible implementations. This is not the case. There have been several noteworthy attempts not only to make the basic service accessible, but to use the platforms that support VoIP to support integral or parallel services and features that would be of tremendous benefit to users with disabilities. VoIP potentially offers all the access opportunities that computer technology does in general, plus some synergistic opportunities unique to the communication needs of people with disabilities. For example:

- Intelligent packet buffering can provide improved TTY compatibility on the incoming side, as the software can respond to network congestion, jitter, and packet loss by adjusting its Baudot decoding performance and making informed guesses about characters
- Audio processing can improve incoming voice quality by interpolation and frequency shifting; processing can be driven by the user's unique audiological requirements
- Users can receive redundant control information using their preferred combination of visual and audio output[5]
- Users can control the interface with the same system they use to control other computer applications, such as speech recognition and keyboard/mouse emulation
- VoIP service can be configured to each user's needs automatically, including input/output preferences, automatic routing of calls, and intelligent directory-based dialing
- VoIP offers integration with other forms of electronic communication (voice mail, email, chat, etc.) that may be usable by and attractive to some people with disabilities

[5] One way of doing this is through the use of "skins", the flexible interfaces now found as a part of some computer applications. Skins allow users to alter the size, graphical content, and font of the application, much the way that style sheets or themes do with web pages.

- VoIP offers integration with and substitution for these same forms of electronic communication when they pose a barrier to some people with disabilities
- VoIP offers several opportunities for improved and less expensive telecommunications relay service (TRS)

Many of these access features may not need to reside in the VoIP software itself, but as part of the VoIP service "pipeline." That is, the VoIP software would manage the establishment of calls and the transmission of packets, but might receive commands and pre-processed audio input from another application, or deliver audio output to another application for further processing. In order for these applications to interoperate, both sides must guarantee compatibility.

We look forward to seeing these enhancements in public VoIP offerings.

However, none of these access enhancements are offered by Vonage. Vonage does not sell an Internet platform or software development environment to its customers. It sells only a basic, traditional voice telecommunications service.

VoIP Applications and Gateways Should Have the Responsibility for Guaranteeing Access According to Existing Regulations

Inclusive Technologies believes that all VoIP products and services should be subject to all the provisions of Section 255 and other regulations.

Computer-based VoIP, as offered by Vonage, appears at first more complicated than regular phone service, because it involves the signal processing and data transmission capabilities of a computer. However, it is our experience that modern computer technology is not the principal barrier to accessible VoIP, because they no longer pose insurmountable barriers to other computer applications. Similarly, modern operating systems include several elements essential to placing and receiving telecommunications calls, but to our knowledge none of these elements by itself determines the accessibility or inaccessibility of those calls. Consumers with disabilities have become able to use computers largely because, due in part to the efforts of people with disabilities and disability-oriented developers and manufacturers, computer hardware and operating

systems are so flexible, so ready to accept modification, and themselves contain many of the accommodation resources required by people with disabilities. The hardware and operating systems have moved from being primary barriers and now are primary enablers of access. It is in the applications that barriers now reside.

We believe that the Commission should use the **state of the art of computer accessibility (and its constant advances) as the standard against which computer-based VoIP should be judged**. In other words, a person who, with or without assistive technology, is able to use a computer to control audio sources (e.g. listen to CDs), should be able to control the audio of a VoIP call. If not, then the VoIP product and/or service has not met the relevant Section 255 Guideline for access to auditory information. The entity responsible for the software application, gateway, or server may be able to show that another element of the computer or any other necessary component not under their control is responsible for inaccessibility, and that there is no readily achievable solution. The same standard should be extended to the other functions of the VoIP product, such as access to controls, displays, etc.

This approach would put VoIP within the same two-tier framework as the other equipment covered by Section 255: build in accessibility if it is readily achievable; if not, build in compatibility if that is readily achievable.

In addition, Vonage customers should be required to pay into the TRS funds appropriate to their jurisdiction. Vonage customers are undoubtedly benefiting from TRS calls, and so should be required to support it exactly as other telecom consumers do.

VoIP Compliance with Section 255 Should Be Readily Achievable in Almost All Cases

We would like to express **our strong belief that VoIP technology can be made fully accessible with very little effort**. Aside from the TTY compatibility issue, all the access issues we raised above fall into four categories:

- Visual interface problems. There are abundant solutions for these, both within the design of the application interface (size, layout, font, contrast, etc.) and through the use of assistive systems.
- Audio quality problems related to jitter and other IP artifacts. Here any improvements made would benefit not only people with hearing loss, but

the all users. The VoIP software companies are presumably motivated to make these improvements.
- Audio problems not related to IP artifacts. Users can adjust the audio volume and tone control of their amplified speakers, use headsets, etc. In short, they may be able to use whatever arrangements they use for other computer-based audio.
- Navigational difficulty or complexity. Here again, improvements would benefit all users.

We are convinced that VoIP companies could address the access requirements of Section 255 “without much difficulty or expense”.

The Commission Should Also Oversee the Accessibility of VoIP Business Practices

In addition to the technology of VoIP, the business practices that support and extend it may pose access barriers to people with disabilities. Technical support hotlines without TTY access, inaccessible websites that provide the only way of upgrading products, and small-print bills plague consumers with disabilities and exclude them from the use of otherwise accessible products and services. The Commission should make clear to VoIP companies that their Section 255 responsibilities include considering accessibility within their:

- Product development processes
- Consumer information
- Product documentation
- Billing
- Technical support and customer care
- Market research
- Technical trials
- Employee training

and any other elements of their business that involves developing their products or communicating with their customers.

The Commission Should Rule on the Section 255 Further Notice of Inquiry

As the Commission promulgated rules for Section 255 of the Telecom Act, it also asked for comment on the accessibility of “IP telephony” as part of a Further Notice of Inquiry (WT Docket No. 96-198). Several comments and replies were received, but the Commission did not initiate a rulemaking.

We ask that the Commission do so, and require Telecom Act compliance for all VoIP products and services, under all Sections.

We understand that there may be reluctance to rule on VoIP because it contains the magic word “Internet”, even though Vonage’s service does not offer the end user anything that could be construed as Internet access.

Should the Commission decide not to rule on VoIP overall, we believe that the Commission should rule to require that VoIP products and services be accessible. That is, the Commission should apply Section 255 to VoIP products and services.

We believe that the Commission could use two powerful arguments in favor of such regulation:

1. Compelling public interest. As VoIP matures, it is essential that manufacturers and service providers understand the needs of their potential customers with disabilities. Unless this occurs, millions of US citizens will be deprived of the ability to benefit from improved service and lower cost.

2. Precedent under the Modified Final Judgment. During the period of judicial oversight of the breakup of the Bell System, at least one instance of a disability-specific ruling went into effect. In order to offer the Telecommunications Relay Service (TRS), local carriers were permitted to carry TRS calls across LATA boundaries, constituting a “special case” of permitted long distance service.